

25. A solution is made by dissolving 25 g of NaCl in enough water to make 1.00 L of solution. Assume that the density of the solution is 1.00 g/cm^3 . Calculate the mass percent, molarity, molality, and mole fraction of NaCl.

29. A solution is prepared by mixing 25 mL pentane (C_5H_{12} , $d = 0.63 \text{ g/cm}^3$) with 45 mL hexane (C_6H_{14} , $d = 0.66 \text{ g/cm}^3$). Assuming that the volumes add on mixing, calculate the mass percent, mole fraction, molality, and molarity of the pentane.

31. A 1.37 M solution of citric acid ($\text{H}_3\text{C}_6\text{H}_5\text{O}_7$) in water has a density of 1.10 g/cm^3 . Calculate the mass percent, molality, mole fraction, and normality of the citric acid. Citric acid has three acidic protons.

37. Which solvent, water or carbon tetra chloride, would you choose to dissolve each of the following in?

a) CO_2 b) NH_4NO_3 c) $\text{CH}_3\text{C}=\text{OCH}_3$ d) $\text{HC}_2\text{H}_3\text{O}_2$ e) $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_3$

37. Which solvent, water or carbon tetrachloride, would you choose to dissolve each of the following?

a. CO_2

d. $\text{HC}_2\text{H}_3\text{O}_2$

b. NH_4NO_3

e. $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_3$

c. $\text{CH}_3\text{C}(\text{O})\text{CH}_3$

41. Rationalize the trend in water solubility for the following simple alcohols:

Alcohol	Solubility (g/100g H ₂ O at 20°C)
Methanol, CH ₃ OH	Soluble in all proportions
Ethanol, CH ₃ CH ₂ OH	Soluble in all proportions
Propanol, CH ₃ CH ₂ CH ₂ OH	Soluble in all proportions
Butanol, CH ₃ CH ₂ CH ₂ CH ₂ OH	8.14
Pentanol, CH ₃ CH ₂ CH ₂ CH ₂ CH ₂ OH	2.64
Hexanol, CH ₃ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ OH	0.59
Heptanol, CH ₃ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ OH	0.09

43. The solubility of nitrogen in water is 8.21×10^{-4} mol/L at 0°C when the N₂ pressure above water is 0.790 atm. Calculate the Henry's Law constant for N₂ in units of mol/L•atm for Henry's law in the form $C = kP$, where C is the gas concentration in mol/L. Calculate the solubility of N₂ in water when the partial pressure of nitrogen above water is 1.10 atm at 0°C.

67. If the human eye has an osmotic pressure of 8.00 atm at 25°C, what concentration of solute particles in water will provide an isotonic eyedrop solution (a solution with equal osmotic pressure) ?

75. Calculate the osmotic pressure at 25°C of a 0.50 M solution of Ca(NO₃)₂ in water. (Assume that $i = 3.0$). Would you expect the measured osmotic pressure of 0.50 M Ca(NO₃)₂ to be higher or lower than the value you calculated? Explain.